

WE CLAIM:

1. A phenol oxidizing enzyme encoded by a nucleic acid capable of hybridizing to the nucleic acid having the sequence as shown in SEQ ID NO:1 or a fragment thereof, under conditions of high to intermediate stringency.
2. The phenol oxidizing enzyme of Claim 1 having at least 60% identity to the phenol oxidizing enzyme having the amino acid sequence as disclosed in SEQ ID NO:2.
3. The phenol oxidizing enzyme of Claim 1 obtainable from a bacteria, yeast or non-*Stachybotrys* fungus.
4. The phenol oxidizing enzyme of Claim 3 wherein said fungus includes Myrothecium species, Curvularia species, Chaetomium species, Bipolaris species, Humicola species, Pleurotus species, Trichoderma species, Mycellophthora species and Amerosporium species.
5. The phenol oxidizing enzyme of Claim 4 wherein the fungus include Myrothecium verrucaria, Curvularia *pallenscens*, Chaetomium sp, Bipolaris *spicifera*, Humicola insolens, Pleurotus abalonus, Trichoderma reesei, Mycellophthora thermophila and Amerosporium *atrum*.
6. The phenol oxidizing enzyme of Claim 4 wherein said fungus is a Biopolaris species, a Curvularia species or a Amerosporium species.
7. The phenol oxidizing enzyme of Claim 6 wherein said fungus is Biopolaris *spicifera*, Curvularia *pallenscens* or Amerosporium *atrum*.
8. The phenol oxidizing enzyme of Claim 1 comprising the amino acid sequence as disclosed in SEQ ID NO:4, SEQ ID NO:7 or SEQ ID NO:9.
9. An isolated polynucleotide encoding the amino acid comprising the sequence as shown in SEQ ID NO:4, SEQ ID NO:7 or SEQ ID NO:9.

10. The isolated polynucleotide of Claim 9 having at least 60% identity to the nucleic acid sequence disclosed in SEQ ID NO:1 or SEQ ID NO:3.

11. The isolated polynucleotide of Claim 10 comprising the nucleic acid sequence as disclosed in SEQ ID NO:3, SEQ ID NO:6 or SEQ ID NO:8.

12. An isolated polynucleotide capable of hybridizing to the polynucleotide comprising the sequence as shown in SEQ ID NO:3, SEQ ID NO:6 or SEQ ID NO:8 or a fragment thereof, under conditions of intermediate stringency.

13. An expression vector comprising the polynucleotide of Claim 10.

14. A host cell comprising the expression vector of Claim 13.

15. The host cell of Claim 14 that is a filamentous fungus.

16. The host cell of Claim 15 wherein said filamentous fungus includes *Aspergillus* species, *Trichoderma* species and *Mucor* species.

17. The host cell of Claim 14 that is a yeast.

18. The host cell of Claim 17 wherein said yeast includes *Saccharomyces*, *Pichia*, *Schizosaccharomyces*, *Hansenula*, *Kluyveromyces*, and *Yarrowia* species.

19. The host cell of Claim 14 wherein said host is a bacterium.

20. The host cell of Claim 19 wherein said bacterium includes *Bacillus* and *Escherichia* species.

21. A method for producing a phenol oxidizing enzyme in a host cell comprising the steps of:

a) obtaining a host cell comprising a polynucleotide capable of hybridizing to the nucleic acid having the sequence as shown in SEQ ID NO:1, or a fragment thereof, under conditions of high to intermediate stringency;

- b) growing said host cell under conditions suitable for the production of said phenol oxidizing enzyme; and
- c) optionally recovering said phenol oxidizing enzyme produced.

5 22. The method of Claim 21 wherein said phenol oxidizing enzyme is obtainable from *Myrothecium* species, *Curvalaria* species, *Chaetomium* species, *Bipolaris* species, *Humicola* species, *Pleurotus* species, *Trichoderma* species, *Mycellophthora* species or *Amerosporium* species.

10 23. The method of Claim 22 wherein the fungus includes *Myrothecium verrucaria*, *Curvalaria pallescens*, *Chaetomium* sp, *Bipolaris spicifera*, *Humicola insolens*, *Pleurotus abalonus*, *Trichoderma reesei*, *Mycellophthora thermophila* or *Amerosporium atrum*.

15 24. The method of Claim 21 wherein the phenol oxidizing sequence comprises the amino acid sequence as disclosed in SEQ ID NO:4, SEQ ID NO:7 or SEQ ID NO:9.

25 25. The method of Claim 21 wherein said polynucleotide comprises the sequence as shown in SEQ ID NO:3, SEQ ID NO:6, or SEQ ID NO:8.

20 26. The method of Claim 21 wherein said host cell includes filamentous fungus, yeast and bacteria.

25 27. The method of Claim 26 wherein said yeast includes *Saccharomyces*, *Pichia*, *Schizosaccharomyces*, *Hansenula*, *Kluyveromyces*, and *Yarrowia* species.

28 The method of Claim 26 wherein said filamentous fungus includes *Aspergillus* species, *Trichoderma* species and *Mucor* species.

30 29. A method for producing a host cell comprising a phenol oxidizing enzyme comprising the steps of:

- a) obtaining a polynucleotide capable of hybridizing to the nucleic acid having the sequence as shown in SEQ ID NO:1, or a fragment thereof, under conditions of high to intermediate stringency;

- b) introducing said polynucleotide into said host cell; and
- c) growing said host cell under conditions suitable for the production of said phenol oxidizing enzyme.

5    30. The method of Claim 29 wherein said host cell includes filamentous fungus, yeast and bacteria.

31. The method of Claim 30 wherein said filamentous fungus includes *Aspergillus* species, *Trichoderma* species and *Mucor* species.

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32. The method of Claim 31 wherein said *Aspergillus* species is *Aspergillus niger* var. *awamori*.

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33. The method of Claim 29 wherein said polynucleotide has at least 60% identity to the nucleic acid shown in SEQ ID NO:1 or SEQ ID NO:3.

34. The method of Claim 33 wherein said polynucleotide comprises the nucleic acid sequence as shown in SEQ ID NO:3, SEQ ID NO:6 or SEQ ID NO:8.